APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/881,500	06/14/2001	Surajit Chaudhuri	15-847 - 4254	7764

7590 03/24/2004	EXAMINER
WATTS, HOFFMANN, FISHER & HEINKE CO., L.P.A. 1100 Superior Ave., Ste. 1750 Cleveland, OH 44114	LEROUX, ETIENNE PIERRE

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/881,500	Applicant(s) CHAUDHURI ET AL.
	Examiner Etienne P LeRoux	Art Unit 2171

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _12 December 2003_ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1,2,4-10,12-17,19,20,22 and 24-30_ is/are pending in the application.

　　4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1, 2, 4-10, 12-17, 19, 20, 22 and 24-30_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _14 June 2001_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

　　Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

　　If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

　　a)☐ All b)☐ Some * c)☐ None of:

　　　　1.☐ Certified copies of the priority documents have been received.

　　　　2.☐ Certified copies of the priority documents have been received in Application No. _____ .

　　　　3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

　　* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

　　a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4)☐ Interview Summary (PTO-413) Paper No(s). _____ .
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: ____ .

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 9, 16 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 9 and 16 are drawn to a method of maintaining a self-tuning histogram but the method steps are difficult to discern because only structure such as the bucket boundaries, the bucket frequency and the bucket boundary range are further limited.

Claim 20 is drawn to apparatus and claims a means for examining results of a query, means for creating at least one candidate hole, means for modifying the boundaries of each candidate hole. It is unclear what physical means Applicant is claiming.

Claim 24 is drawn to system. It is unclear what component receives a bucket from the histogram and what comprises a tuning component.

Claims 2, 4-10, 12-17, 19 and 25-30 are rejected for being dependent from a rejected base claim.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1, 9 and 16 of the claimed invention are rejected under 35 U.S.C. 101 because they directed to non-statutory subject matter.

Claims 1, 9 and 16 can be performed manually and thus is not related to the technological arts. In particular, it is unclear how the self-tuning histogram is maintained by means of automated electronic process. Furthermore, maintaining a histogram as claimed represents an abstract mathematical construct

Claim Rejections - 35 USC § 103

1.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2.   Claims 1, 4-7 and 24-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pat No 5,920,870 issued to Briscoe et al (hereafter Briscoe '870) in view of US Pat No 6,507,840 issued to Ioannidis et al (hereafter Ioannidis '840).

Claim 1:

Briscoe '870 discloses in a database system, having a plurality of existing buckets arranged in a hierarchical manner and defined by at least two bucket boundaries, a bucket volume and a bucket frequency comprising the step of creating at least one new bucket in response to a query on the database wherein each new bucket is contained within at least one existing bucket and wherein the new bucket becomes a child bucket and the existing bucket becomes a parent bucket [col 7, lines 30-53]

Claims 1 and 24-30:

In a database system, a method of maintaining a self-tuning histogram having a plurality

of existing buckets arranged in a hierarchical manner [col 2, line 61 through col 3, line 10] and

defined by at least two bucket boundaries that represent a range of attribute values, a bucket

volume, and a bucket frequency [col 6, lines 10-18] that corresponds to a number of tuples

having attribute values that fall in the bucket boundary range comprising:

- at least one new bucket [col 8, lines 7-13] in response to a query on the database wherein

  the new bucket has bucket boundaries corresponding to a range of tuple attiribute values

  returned by the query and a bucket frequency corresponding to a number of tuples

  returned by the query [col 5, lines 24-40 and col 6, lines 18-47] and

- wherein each new bucket is contained within at least one existing bucket [col 7, lines 30-

  53]and

- wherein the new bucket becomes a child bucket that has a child bucket frequency and the

  existing bucket becomes a parent bucket that has a parent bucket frequency [col 7, lines

  30-53].

  Briscoe '870 discloses the elements of claim 1 as noted above.

  Briscoe '870 fails to disclose a histogram.

  Ioannidis '840 discloses a histogram [Fig 5]

It would have been obvious to one of ordinary skill in the art at the time the invention

was made to modify Briscoe '870 to include a histogram as taught by Ioannidis '840.

The ordinarily skilled artisan would have been motivated to modify Briscoe '870 as above for the purpose of improving the invention by providing a method for generating an approximate answer in response to a query to a database [col 4, lines 1-5]

Claim 4:

The combination of Briscoe '870 and Ioannidis '840 disclose the elements of claim 1 as noted above.

The combination of Briscoe '870 and Ioannidis '840 fails to discloses wherein a total number of buckets is limited to a predetermined budget.

Official Notice is taken that wherein a total number of buckets is limited to a predetermined budget is well-known and expected in the art.

The ordinarily skilled artisan would have been motivated to modify the combination of Briscoe '870 and Ioannidis '840 as above for the purpose of allocation resources on an economical basis.

Claim 5:

The combination of Briscoe '870 and Ioannidis '840 discloses the elements of claims 1 and 4 as noted above.

The combination of Briscoe '870 and Ioannidis '840 fails to disclose the step of merging buckets based on a merge criterion when the total number of buckets exceeds the predetermined budget.

Official Notice is taken that the step of merging buckets based on a merge criterion when the total number of buckets exceeds the predetermined budget is well-known and expected in the art.

The ordinarily skilled artisan would have been motivated to modify the combination of Briscoe '870 and Ioannidis '840 as above for the purpose of allocating resources on an economical basis.

Claim 6:

The combination of Briscoe '870 and Ioannidis '840 discloses the elements of claims 1, 4 and 5 as noted above.

The combination of Briscoe '870 and Ioannidis '840 fails to disclose wherein the merge criterion is a similar bucket density, wherein bucket density is based on the bucket frequency divided by the bucket volume.

Official Notice is taken that wherein the merge criterion is a similar bucket density, wherein bucket density is based on the bucket frequency divided by the bucket volume is well-known and expected in the art.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combination of Briscoe '870 and Ioannidis '840 to include wherein the merge criterion is a similar bucket density, wherein bucket density is based on the bucket frequency divided by the bucket volume

The ordinarily skilled artisan would have been motivated to modify the combination of Briscoe '870 and Ioannidis '840 as noted above for the purpose of determining whether the memory utilization has been done on an economical basis.

Claim 7:

Briscoe '870 discloses shrinking the boundaries of each new bucket if the boundaries of the new bucket intersect any existing bucket boundaries [col 11, lines 14-33].

3.   Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of

Briscoe '870 and Ioannidis '840 and further in view of US Pat No 6,353,832 issued to Acharya

et al (hereafter Acharya '832).

Claim 2:

       The combination of Briscoe '870 and Ioannidis '840 discloses the elements of claim 1 as

noted above.

       The combination of Briscoe '870 and Ioannidis '840 fails to disclose a rectangular

bucket.

       Acharya '832 discloses a rectangular bucket.

       It would have been obvious to one of ordinary skill in the art at the time the invention

was made to modify the combination of Briscoe '870 and Ioannidis '840 to include a rectangular

bucket as taught by Acharya '832.

       The ordinarily skilled artisan would have been motivated to modify the combination of

Briscoe '870 and Ioannidis '840 for the purpose of improving the invention by providing

accurate estimate estimates for point and range queries over two-dimensional spatial data [col 1,

lines 50-55]

4.   Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of

Briscoe '870 and Ioannidis '840 and further in view of US Pat No 5,991,764 issued to

Sundaresan (hereafter Sundaresan '764), as best examiner is able to ascertain.

Claim 8:

The combination of Briscoe '870 and Ioannidis '840 discloses the elements of claim 1 as noted above.

The combination of Briscoe '870 and Ioannidis '840 fails to disclose wherein the frequency of the parent bucket is diminished by the frequency of the child bucket.

Sundaresan '764 discloses wherein the frequency of the parent bucket is diminished by the frequency of the child bucket [Fig 6]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combination of Briscoe '870 and Ioannidis '840 to include wherein the frequency of the parent bucket is diminished by the frequency of the child bucket as taught by Sundaresan '764.

The ordinarily skilled artisan would have been motivated to modify the combination of Briscoe '870 and Ioannidis '840 as above for the purpose of dividing a task so that it may be distributed among processors operating in parallel [col 1, lines 50-55]

Claims 9, 12-14, 16, 19, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Briscoe '870 and Ioannidis '840 and further in view of Pub No US 2001/0010091 issued to Noy (hereafter Noy '091).
Claims 9, 16, 20 and 22:

The combination of Briscoe '870 and Ioannidis '840 discloses the essential elements of claim 9 as noted above.

The combination of Briscoe '870 and Ioannidis '840 fails to disclose creating at least one candidate hole in the histogram based on the results of the query.

Noy '091 discloses creating at least one candidate hole in the histogram based on the results of the query [paragraph 21]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combination of Briscoe '870 and Ioannidis '840 to include creating at least one candidate hole in the histogram based on the results of the query as taught by Noy '091.

The ordinarily skilled artisan would have been motivated to modify the combination of Briscoe '870 and Ioannidis '840 as above for the purpose of improving the invention by determining that certain sets of constraints will prevent certain values or ranges of values from being reached by the test and modifying the input process to test those areas.

Claim 12:

The combination of Briscoe '870, Ioannidis '840 and Noy '091 discloses the elements of claim 9 as noted above.

The combination of Briscoe '870, Ioannidis '840 and Noy '091 fails to disclose wherein a total number of buckets is limited to a predetermined budget.

Official Notice is taken that wherein a total number of buckets is limited to a predetermined budget is well-known and expected in the art.

The ordinarily skilled artisan would have been motivated to modify the combination of Briscoe '870, Ioannidis '840 and Noy '091 as above for the purpose of allocation resources on an economical basis.

Claims 13 and 19:

The combination of Briscoe '870, Ioannidis '840 and Noy '091 discloses the elements of claims 1 and 4 as noted above.

The combination of Briscoe '870, Ioannidis '840 and Noy '091 fails to disclose the step

of merging buckets based on a merge criterion when the total number of buckets exceeds the

predetermined budget.

Official Notice is taken that the step of merging buckets based on a merge criterion when

the total number of buckets exceeds the predetermined budget is well-known and expected in the

art.

The ordinarily skilled artisan would have been motivated to modify the combination of

Briscoe '870, Ioannidis '840 and Noy '091 as above for the purpose of allocating resources on an

economical basis.

Claim 14:

The combination of Briscoe '870 and Ioannidis '840 and Noy '091 discloses the elements

of claims 11 and 13 as noted above.

The combination of Briscoe '870, Ioannidis '840 and Noy '091 fails to disclose wherein

the merge criterion is a similar bucket density, wherein bucket density is based on the bucket

frequency divided by the bucket volume.

Official Notice is taken that wherein the merge criterion is a similar bucket density,

wherein bucket density is based on the bucket frequency divided by the bucket volume

is well-known and expected in the art.

It would have been obvious to one of ordinary skill in the art at the time the invention

was made to modify the combination of Briscoe '870, Ioannidis '840 and Noy '091 is based on

the bucket frequency divided by the bucket volume

The ordinarily skilled artisan would have been motivated to modify the combination of Briscoe '870, Ioannidis '840 and Noy '091 as above for the purpose of determining whether the memory utilization has been done on an economical basis.

5.   Claims 10 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Briscoe '870, Ioannidis '840 and Noy '091 and further in view of Acharya '832. Claims 10 and 17:

The combination of Briscoe '870, Ioannidis '840 and Noy '091 disclose the elements of claim 9 as noted above.

The combination of Briscoe '870, Ioannidis '840 and Noy '091 fails to disclose a rectangular bucket.

Acharya '832 discloses a rectangular bucket.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combination of Briscoe '870, Ioannidis '840 and Noy '091 to include a rectangular bucket as taught by Acharya '832.

The ordinarily skilled artisan would have been motivated to modify the combination of Briscoe '870, Ioannidis '840 and Noy '091 as above for the purpose of improving the invention by providing accurate estimate estimates for point and range queries over two-dimensional spatial data [col 1, lines 50-55]

6.   Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Briscoe '870, Ioannidis '840 and Noy '091 and further in view of Sundaresan '764.

Claim 15:

The combination of Briscoe '870, Ioannidis '840 and Noy '091 discloses the elements of

claim 9 as noted above.

The combination of Briscoe '870, Ioannidis '840 and Noy '091 fails to disclose wherein

the frequency of the parent bucket is diminished by the frequency of the child bucket.

Sundaresan '764 discloses wherein the frequency of the parent bucket is diminished by

the frequency of the child bucket [Fig 6]

It would have been obvious to one of ordinary skill in the art at the time the invention

was made to modify the combination of Briscoe '870, Ioannidis '840 and Noy '091 to include

wherein the frequency of the parent bucket is diminished by the frequency of the child bucket as

taught by Sundaresan '764.

The ordinarily skilled artisan would have been motivated to modify the combination of

Briscoe '870, Ioannidis '840 and Noy '091 as above for the purpose of dividing a task so that it

may be distributed among processors operating in parallel [col 1, lines 50-55]

Response to Arguments

Applicant's arguments filed 12/12/2003 have been fully considered but they are not

persuasive.

Applicant Argues:

Applicant states on page 10 "Neither Briscoe nor Ioannidis, alone or in combination,

teaches or suggests the method of claim 1. The buckets described in Briscoe are subsets of data

in the database system such as sets of tables, columns or combinations of data (Column 6, lines

10-18) and do not feature bucket boundaries corresponding to a range of attribute values and a frequency corresponding to a number of tuples that fall in the range."

Examiner Responds:

Examiner is not persuaded. Examiner maintains the following teaching by Briscoe reads on above limitations:

The multi-layer abstraction bucket mechanism of the present invention includes a plurality of hierarchically connected abstraction layers, wherein each abstraction layer includes a methods object for storing methods for operating on data and performing corresponding operations on data received from a data bucket of a hierarchically next lower abstraction layer, a data operation object responsive to a request for an operation to be performed on the data received from the next lower abstraction layer for selecting a corresponding method to be executed by the method object, a data bucket for storing the results of a method executed by the methods object and providing the results as data to a hierarchically next higher abstraction layer, and a map connected to the data operation object and to the methods object for storing information for constructing the data bucket and for relating requests for operations to methods residing in the methods object.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this

final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Etienne LeRoux whose telephone number is (703) 305-0620.

The examiner can normally be reached on Monday – Friday from 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Safet Metjahic, can be reached on (703) 308-1436.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is (703) 305-3900.

Etienne LeRoux

March 22, 2004

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